

The crust in southern Mongolia is part of the Central Asian Orogenic Belt, a vast accretionary orogen that records the opening and closure of the Palaeo-asian Ocean in the late Proterozoic to Palaeozoic. The crustal evolution of the region is revealed in basement inliers that also contain intrusion-related porphyry ore bodies that are important mineral exploration targets. The Saykhandulaan inlier in Southeast Mongolia is a Devonian–Carboniferous segment of island-arc crust, which is dominantly composed of extrusive and sedimentary lithologies, but which also contains the Oyut Ulaan I-type quartz-monzonite intrusion. A U–Pb zircon age for the Oyut Ulaan monzonite indicates emplacement at 330.0 ± 0.5 Ma. To the east of the Saykhandulaan inlier, intrusive complexes dominate the neighbouring Mandakh inlier. New ages are presented for four of these plutons; the Bronze Fox granodiorite (333.6 ± 0.6 Ma); the Narin Hudag monzonite (333.2 ± 0.6 Ma); the Shuteen quartz monzonite (325.5 ± 1.0 Ma); and the North Mandakh granite (292.3 ± 0.5). The intrusive bodies of the Saykhandulaan and Mandakh inliers have two distinct geochronological and geochemical associations: 1) mid-Carboniferous I-type monzonites that constitute the most easterly intrusive expression of the Southern Mongolia Carboniferous Arc and, 2) Early Permian A-type and peralkaline granites that represent a post-orogenic phase of voluminous granite emplacement. Both groups are significantly younger than the nearby Oyu Tolgoi and Tsagaan Suvarga Cu-porphyry ore bodies, which have previously been dated as early- and late-Devonian respectively. The new data presented here provide constraints on the timing of the transition from island-arc magmatism to post-collisional extension-related magmatism in the region and possible controls on fertile and infertile granitoid intrusions with respect to Cu–Au mineralisation.